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EXAMINER	
ZHU, RICHARD Z	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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DETAILED ACTION

Response to Applicant's Arguments

1. **In response to** "Claim 1 explicit recites that at least two layers of different vertical positions are simultaneously printed, not affixed. Jang et al., in describing that layers can be simultaneously affixed, does not prejudice this feature of claim 1. The fact that Jang et al. simultaneously affix two layers together has no bearing whatsoever on whether those two layers were printed simultaneously. In fact, Applicant points out that in order to affix two layers, the two layers must have already been printed. One cannot affix two layers when the two layers do not yet even exist. Accordingly, the Examiner's reliance on this teaching of Jang et al. at paragraph [0117] is untenable".

   The examiner agrees, the position is indeed untenable. However, applicant is reminded of the fact that the primary reference, ***Penn***, still discloses the simultaneous printing feature of Claim 1 (**See page 3 of Final Office Action**).

2. **In response to** "Applicant does not see how a variation of Penn et al. in view of Jang et al. to arrive at the claimed invention can be a "predictable variation". In both references, one vertical layer is completed before a subsequent vertical layer is printed on top of the layer just complete. The "reconfiguration" feature taught be Jang et al. is clearly a reconfiguration performed after one vertical layer is completed. A variation of Penn et al. such that one of the printheads is moved to a different vertical position to commence printing of a subsequent vertical layer is not predictable at all from the teachings of the presently cited references, nor simply from common knowledge in the art at the time. Further, such a variation would change the single-pass principle of operation utilized by Penn et al., and as such would be an

improper variation (MPEP 2143.01 VI). Without changing the principle of operation of Penn et al. (i.e. a one pass printing of a vertical layer including both conductive and insulating material), Penn et al. cannot be modified to print two or more vertical layers simultaneously".

The examiner disagrees. In order for a combination to be impermissible, the modification proposed by the secondary reference must alter the fundamental operating principles of the primary reference so much so that the primary reference is rendered inoperable. This is not the case in ***Penn*** modified by ***Jang***.

Here, the applicant's limitation requires "a series of printheads for printing the layers, the series of printheads simultaneously printing at least two layers of different vertical positions within the stack", the system is operable to reconfigure a printhead initially configured to print a layer at a first vertical position to print a layer at a second vertical position .

Penn teaches a series of printheads for printing the layers, the series of printheads simultaneously printing at least two layers of the same vertical position within the stack. In the context of ***Penn***'s invention, this refers to simultaneously printing a first layer of material 35 and a second layer of material 25 (**Fig 12**).

Jang teaches printing at least two layers of different vertical positions within a stack. In the context of ***Jang***'s invention, this refers to printing a first layer of first material (**Paragraph 114**) to thereafter reconfigure a printhead to print a second layer of second material (**Paragraph 115**) in vertical successions.

First and foremost, ***Jang*** suggests to one of ordinary skill in the art that a single vertical stack of material does not need to be restricted to the heterogeneous mixture as

specified by ***Penn***, that it can be homogenous such that a first stack comprises a first layer of material 25 at a first vertical position and a stack comprises a second layer of material 35 at a second vertical position. If ***Penn*** can use at least two printheads to simultaneously print the first material 25 and the second material 35 within the same vertical position, then it is not unpredictable for one of ordinary skill in the art to arrive at the configuration where the two materials are simultaneously printed at two distinct vertical positions because ***Jang*** (1) explicitly suggested that it is possible, and (2) teaches a computer program for generating instructions that enables the implementation of such a print configuration, and (3) there is no teaching within ***Penn*** that explicitly prohibits such a modification or otherwise suggest such a modification would render the invention inoperable. The motivation for making the modification would've been to fulfill the need of a user to arrive at a desired physical property for the 3D manufacture such as hardness, mass density, coefficient of thermal expansion, and external appearance such as color patterns (**Paragraph 109, yes, it is referring to heterogeneous materials in a single vertical stack but such desire are equally applicable to homogenous materials at distinct vertical stacks**) employing office equipments that are both efficient and cost effective (**Paragraphs 18 and 20**).

Second, in the example of ***Jang*** has only one printhead (**Fig 1**), ***Jang*** teaches a configuration that enables said printhead to first print a first layer of first material and operable to reconfigure said printhead to print a second layer of second material. Therefore, the concept of dynamic reconfiguration of a single printhead has been taught. ***Jang*** further suggested that to increase the mechanical integrity of object, it would be preferred to substantially fill up the pores in the positive region using a configuration where more than

one dispensing device each with one or multiplicity of nozzles may be used (**Paragraph 63**), i.e., the configuration of ***Penn*** in Fig 12 where more than one material dispensing device or printhead with at least one nozzle each.

Therefore, in making the combination, the examiner found a base device in ***Penn*** that already simultaneously prints two different materials and it is ready to be improved by a known technique of printing the two different materials in respective vertical stacks suggested by ***Jang***, to achieve the desired compositional properties for making a 3D object that would've been easily recognized by one of ordinary skill in the art. Thus, the resulting configuration is predictable and sufficient in the degree of obviousness to render applicant's invention unpatentable.

Therefore, examiner's combination, while intended to reject applicant's claim and whose search strategy for the relevant art are inspired by applicant's invention, the teachings, the motivations, and the rationales are glean solely from the available arts. Therefore, it constitutes permissible hindsight.

3. In response to "In order to arrive at the claimed invention, one would need to modify Penn et al. so as not to utilize its single-pass principle of operation. Further, one would need to further add (from some unknown source) to the teaching of Jang et al. such that a printhead is vertically reconfigured at any time during the printing of any vertical layer, rather than only at the completion of the printing of one vertical layer. Only then, would the claimed invention be taught. Such a combination is neither predictable, nor a use of two known methods".

Momentarily disregarding the broad scope of Claim 1, the examiner makes note of the fact that the applicant reconfigures a printhead initially configured to print a first material to print a second material as part of error hiding procedure when printhead configured to print the second material is faulty, not at any time. In this case, it is immaterial that ***Jang*** dynamically reconfigures a printhead initially printing a first material to print a second material for a different reason than the applicant's reason for dynamic reconfiguration.

Referring to the broad scope of the claim, the modification is such that Penn would simultaneously print two layers of materials, at two different vertical positions within a first pass, for example y = 1 and 2 respectively. Thereafter, it is dynamically reconfigured to simultaneously print the next two layers of materials at y = 3 and 4 respectively.

Lastly, the examiner simply does not see how the single pass principle can be alter by simultaneously printing two layers of materials at two distinct vertical positions within each single pass and how even if it is altered, it could render the operations of ***Penn*** undesirable because no evidence has been submitted or any teaching within ***Penn*** or ***Jang*** to suggest that it is undesirable.

The arguments of counsel, in this case the applicant, cannot take the place of evidence in the record. See In re Schulze, 346 F.2d 600, 602, 145 USPQ 716, 718 (CCPA 1965); In re Geisler, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997). Therefore, without factual evidence supporting the undesirability of ***Penn*** if modified by ***Jang***, the applicant has failed to sustain the burden of rebuttal.

Therefore, it is examiner's conclusion that applicant's invention possesses neither novelty nor an inventive step.

4. Examiner's note:

From the format of applicant's after final amendment, it appears that the applicant intends to file an appeal. However, because the applicant has forgotten to pay the proper appeal fee and file a notice of appeal **(See MPEP 1204 and 37 CFR 41.31)**, it is treated as an after final amendment. As such, applicant is advised to follow the proper procedures for appeal in order to expedite the instant application to the board of patent appeals and interference.

/Richard Z. Zhu/

Examiner, Art Unit 2625